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Title

Terahertz thermal spectroscopy of a NbN superconductor

Source

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Abstract

We report far-infrared optical properties of a NbN superconductor. Transmission through a high-quality NbN film grown on a birefringent sapphire substrate above and below its superconducting transition down to the zero-temperature limit is measured at six different frequencies from 0.4 to 2.5 THz both above and below its optical gap. The experimental results agree with theoretical calculations developed based on utilization and extension of the BCS model of Zimmermann et al. [Physica C 183, 99 (1991)] applied for the NbN film. Full quantitative agreement over the entire ranges of temperature and frequencies is found based solely on the physical properties of this NbN film sample and on the parameters of an identical sapphire substrate as measured in time-domain spectroscopy experiments, without use of any additional fitting parameters.